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AUTHOR Clark, Henry T., III; And Others
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ABSTRACT

To investigate the relationship between reading ability and the detection and repair of text-based (internal) inconsistencies, a study examined 100 college students enrolled in an introductory educational psychology course at a large state university. Based on their performance on the comprehension portion of the Nelson-Denny Reading Test, subjects were classified as good readers (43 students), average readers (39 students), and poor readers (18 students). The study employed four short reading passages, and constructed a second version of those passages by changing one or two words in a critical line to include information that contradicted earlier information in the passage. Consistent and inconsistent versions of the four passages were divided into two "Passage Groups," each containing two consistent and two inconsistent passages. Subjects were randomly assigned to one of the two passage groups; within each group, half the subjects received the four passages in random order, and half received the passages in reverse order. After reading each passage on microcomputer, students answered questions that probed for detection of text-based inconsistencies embedded in the passage. Results suggested that differences existed among good, average, and poor college readers in evaluation of text for coherence, but not in strategic repair following recognition of comprehension failure. Findings indicated that evaluation of text for coherence related to the nature of the reader's semantic involvement with the text, and that this involvement varied with reading ability. (Two figures are appended.) (MM)

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Detection and Repair of Text-Based Inconsistencies by Good, Average, and Poor College Readers

Henry T. Clark III
The Pennsylvania State University

Lori A. Forlizzi Thomas J. Ward Sandra C. Brubaker
The Pennsylvania State University

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Abstract

One hundred college students categorized as good (N=43), average (N=39), or poor (N=18) readers on the basis of standardized reading comprehension scores participated in the present research investigating the detection and repair of text-based inconsistencies. Subjects read 4 passages presented on a microcomputer, and answered questions that probed for detection of text-based inconsistencies embedded in the passages. Movement through the text was self-paced. Dependent measures were error detection rate, and two processing measures tapping use of rereading and pausing. Good readers detected more inconsistencies than did poor readers, with average readers not significantly different from either group. Analysis of the processing measures indicated that subjects who detected the text-based errors were more likely than those who did not to regress and reread a previous portion of the text immediately following detection of the error. However, among those who detected the inconsistencies, use of rereading were not related to reading ability. Results suggest that differences exist among good, average, and poor college readers in evaluation of text for coherence, but not in strategic repair following recognition of comprehension failure. It is suggested that evaluation of text for coherence relates to the nature of the reader's semantic involvement with text, and that that involement varies with reading ability. Additional research is recommended investigating the factors that relate to semantic involvement and the relationship between those factors and reading ability.

The relationship between metacognition and reading performance has received a great deal of recent research attention. Of greatest concern to reading researchers are those aspects of metacognition involved in metacomprehension. Metacomprehension refers to knowledge about reading and one's own reading abilities as well as regulation of those abilities (Baker & Brown, 1984). One major aspect of metacomprehension, comprehension monitoring, involves the evaluation and regulation of one's ongoing comprehension processes (Baker, 1979). Evaluation, keeping track of the success of comprehension processes, includes such activities as assessing understanding of text propositions and testing text for internal and external consistency. Regulation involves the implementation of strategic behavior to ensure that comprehension proceeds smoothly. When comprehension fails, regulation might involve the implementation of remedial, or repair, strategies to cope with the comprehension difficulty. Repair strategies include activities such as rereading the current sentence; regressing to, and rereading, a previous portion of the text; inferencing; and regularizing (Baker, 1979, 1984; Winograd & Johnston, 1980; Markman, 1977, 1979). Effective comprehension monitoring involves a sequence of decisions both about the adequacy of current understanding, and about any actions to be undertaken should current understanding be deemed to be inadequate. A model of the decision sequence in comprehension monitoring is presented in Figure 1. It should be noted that the decisions readers make while monitoring their understanding are not necessarily conscious ones, and that readers may not be aware of some or all of the processes they use to promote comprehension.

Despite its limitations (Winograd & Johnston, 1982), the most widely used paradigm in the study of comprehension monitoring has been the error detection paradigm (Baker, 1979; Baker & Anderson, 1982; Garner, 1980; Garner & Reis, 1981; Garner & Kraus, 1982; Hare &

Borchardt, 1985; Reis & Spekman, 1983). In this paradigm, errors of various types (semantic, syntactic, referential, spelling) are introduced into text to prompt comprehension failure and to provide specific points of reference for studying strategies readers use in coping with comprehension difficulty. Results of investigations involving detection and repair of semantic errors in text indicate that the overall rate of detection of inconsistencies is low even among competent readers (Baker, 1979; Hare & Borchardt, 1985; Reis & Spekman, 1983; Winograd & Johnston, 1982), that good readers are more likely than poor readers to detect inconsistencies in text (Garner, 1980; Garner & Reis, 1981; Garner & Kraus, 1982) and to engage in strategies to cope with the inconsistencies (Garner & Reis, 1981), and that readers who detect inconsistencies in text are more likely to engage in repair strategies than readers who do not detect inconsistencies (Baker & Anderson, 1982). In the context of the model of comprehension monitoring presented in Figure 1, this research supports differences between good and poor readers in steps one and four, and between those readers who detect text errors and those who do not in step four. What remains unclear, however, is whether the greater use of repair strategies by good readers is primarily a result of their higher detection rate for problems in text, or whether it reflects more appropriate corrective action in addition to better detection.

The present research had two purposes. The first purpose was to investigate the relationship between reading ability and the detection of text-based (internal) inconsistencies. This represents a replication of previous research. Based on that research, it was expected that detection of the text inconsistencies would be related to reading ability. The second purpose of this research was to separate the relationship between reading ability and error detection (evaluation) from the relationship between reading ability and the selection and implementation

of corrective action (regulation). This involved investigation of the use of two specific strategies (rereading and pausing) by good, average and poor college readers conditioned on detection of the inconsistencies. While pausing is not itself a repair strategy, it does provide an overt index of additional time spent on comprehension. This additional time may reflect use of covert repair strategies such as inferencing or regularizing. If good readers are superior to poor readers in both evaluation and regulation, then one would expect to find an interaction between reading ability and passage consistency among those who detect the errors. However, if the difference between good and poor readers is primarily in their evaluation processes, then no such interaction should be found.

Method

Subjects. One hundred undergraduates enrolled in an introductory educational psychology course at a large state university volunteered to participate in this study to fulfill an extra credit option for the course. These subjects participated in a screening session during the first two weeks of the semester. At that time they were given the Nelson-Denny Reading Test. Based on their performance on the 36-item Comprehension portion of the test, subjects were classified as good (N=43), average (N=39), or poor readers (N=18). Good and poor readers represent the 75th (Scores>30) and 25th (Scores<22) percentiles respectively on the Nelson-Denny norms (Brown, Bennet & Hanna, 1981). The KR#20 reliability of the Comprehension portion of the Nelson-Denny with the screening group was .87.

Materials. The study employed four short (M=214 words) reading passages adapted from Baker & Anderson (1982) and Reis & Spekman (1983). A second version of each passage was constructed by changing one or two words in a critical line to include information that contradicted information presented earlier in the passage.

The consistent and inconsistent versions of the four passage were divided into two Passage Groups, each containing two consistent and two inconsistent passages. The passages in each Passage Group were embedded in four additional passages not containing text-based errors, and ordered at random with the constraint that no two passages from the same consistency category occurred successively.

A set of three short-answer questions was constructed for each passage. One question in each set asked specifically about the information presented in the critical line of the passage while the other two asked about information not related to the critical line. A fourth question was included with each set asking if the passage "made sense" or if there was anything confusing, contradictory, or inconsistent about the passage.

Design. The study employed a 3 Reading Ability (good, average or poor readers) X 2 Consistency (consistent or inconsistent version) design. Reading Ability was a between subjects factor while Consistency was a within subjects factor. The dependent variables were detection rate for the inconsistencies and two processing measures, reading rate for the critical sentence (Critical Reading Rate), and probability of making a regression at the critical sentence containing the inconsistency (Critical Regressions). Reading rate is reported in words per minute. A regression was defined as a movement back to a previous line in the passage. Rapid movement back to a previous line before pausing to reread was considered to be a single regression even if the movement crossed several sentences of text. A critical regression was defined as a regression made at the point of the critical line or at the next successive line. For the purposes of analysis, data were averaged across the two passages of the same Consistency for each subject.

Procedures. Subjects returned approximately two weeks after the initial screening

session and participated in a single experimental session. Subjects were told that they would read several passages presented on a computer and that they would be asked to answer some questions about each passage. There was no indication given that some of the passages contained inconsistent information. Subjects were then randomly assigned to one of the two Passage Groups. Within each Passage Group, half of the subjects received the four passages in the original random order, and half received the passages in reverse order.

Passages were presented one sentence at a time on an Apple II computer. Subjects controlled movement through the passage by pressing a predesignated key to move either to the next sentence or to the previous sentence. Subjects were allowed as much time as they needed to complete each passage. The computer recorded forward and backward (regressive) movement through the passage and the amount of time spent on each sentence in the passage. These procedures are similar to those used by Baker & Anderson (1982). After each passage, subjects were given the set of questions pertaining to that passage on a separate sheet of paper, and were asked to write out answers to the questions. Time to complete the experimental session ranged from 30 minutes to 90 minutes with an average of 40 minutes.

Following completion of the experimental task, subjects were thanked for their participation, and asked not to discuss the reading task or materials with any other students.

Results

The analysis of the data was conducted in two phases. The initial analyses addressed the relationship between reading ability and detection of inconsistencies. Subsequent analysis of the processing measures was conducted grouping subjects according to Detection (detected or did not detect the inconsistencies). Subjects who noted or described the passage inconsistency either in

their answer to the specific question probing that information or in the followup question asking whether they had detected any inconsistent or confusing information were categorized as detectors.

An ANOVA on number of inconsistencies detected revealed a significant effect for Reading Ability ($F(2,97)=3.16$, $p<.05$). Post hoc contrasts indicated that good readers ($M=.70$) detected significantly more inconsistencies than poor readers ($M=.28$), with average readers ($M=.42$) not significantly different from either of the other groups.

For the subsequent analysis of the processing measures, Detection was dichotomized with those detecting one or both of the inconsistencies categorized as Detectors and those detecting neither inconsistency categorized as Non-detectors. Data were analyzed using a 2 (Detection) X 3 (Reading Ability) X 2 (Consistency) mixed ANOVA of Critical Reading Rate, and Critical Regressions.

For Critical Rate, there was a main effect for Consistency ($F(1,94)=8.08$, $p<.01$). Reading rate for the critical line was significantly slower when it contained inconsistent information ($M=116.34$) than when it contained consistent information ($M=135.65$).

For Critical Regressions, there was a significant Detection X Consistency interaction ($F(1,94)=4.06$, $p<.05$). This interaction is presented in Figure 2. The interaction was explored using Newman-Keuls contrasts. For those readers who did not detect the inconsistencies, there was no difference in the probability of regressing after consistent ($X=.28$) or inconsistent ($X=.14$) critical sentences. Those who did detect the inconsistencies, however, were more likely to regress following a critical sentence containing inconsistent information ($X=.50$) than after a critical sentence containing consistent information ($X=.14$).

Discussion

Results of the present investigation are consistent with prior research in finding that detection of text-based inconsistencies is related to reading ability. This supports the view that good readers differ from poor readers in their sensitivity to the existence of problems in text (evaluation). Analysis of the processing measures, however, provides less support for an advantage of good readers over poor readers following error detection (regulation).

Analysis of Critical Rate indicate that readers in general spent more time on the critical sentence when it contained inconsistent information than when it contained consistent information. This pausing, or slowing of reading rate, may reflect some sensitivity on the part of the readers to something in the sentence requiring additional processing, but the absence of any interaction involving Detection suggests that the additional processing was not specific to the activation of repair strategies following detection of a problem.

Analysis of Critical Regressions, however, does provide evidence for the use of rereading as a repair strategy. The significant Detection X Consistency interaction indicates that readers who did not detect the text-based inconsistencies made no specific use of rereading to cope with the inconsistent sentence. Readers who did detect the inconsistencies, however, made significantly more regressions when the critical sentence presented inconsistent information than when it presented consistent information. This indicates not only sensitivity to the existence of a comprehension problem, but also some sensitivity to the nature of the problem. The absence of any interaction involving Reading Ability indicates that, provided the inconsistency was detected, the use of rereading was not dependent on reading ability. That is, poor readers who detected the inconsistency were just as likely to regress and reread a previous portion of the text as were good readers.

While prior research has demonstrated differences between good and poor readers in both their ability to detect inconsistencies in text, and in their use of specific strategies while reading text containing inconsistent information, the question has remained whether good readers have more strategic ability than poor readers, or whether they merely recognize more opportunities to display strategic behavior. The present research suggests that observed differences in the use of rereading may be a function of differences in detection rather than differences in strategies for coping with text-based inconsistencies. Although the present research found clear differences in the use of rereading among readers who detected and readers who did not detect text inconsistencies, the absence of any interactions with Reading Ability indicates that there was no difference in the strategic behavior of good, average and poor college readers following detection of inconsistencies. Although not reported here, parallel research with the same population has found the use of rereading to be associated with detection of text-based inconsistencies, and pausing without rereading previous text portions to be associated with detection of knowledge-based inconsistencies. This supports the view that readers who detected the problems, irrespective of their relative reading ability, were sufficiently sensitive to the nature of the problem to implement an appropriate corrective strategy.

Given the current climate of concern about the level of basic skills among college students, the observation that college students are relatively poor at detecting semantic errors in text is cause for concern. Differences among good, average, and poor college readers, however, appear to be in detection of inconsistencies rather than in strategic behavior following detection. It may well be the case that the degree of students' semantic involvement with text, particularly poor readers' involvement, may be insufficient to allow for effective evaluation of text for logical coherence. Whether the problems with evaluation of text are due to insufficient attention to the

reading task, insufficient depth of processing of text information, variations in criteria for assessing coherence, or some combination of these, is a matter for further research, as is the relationship of these factors to reading ability.

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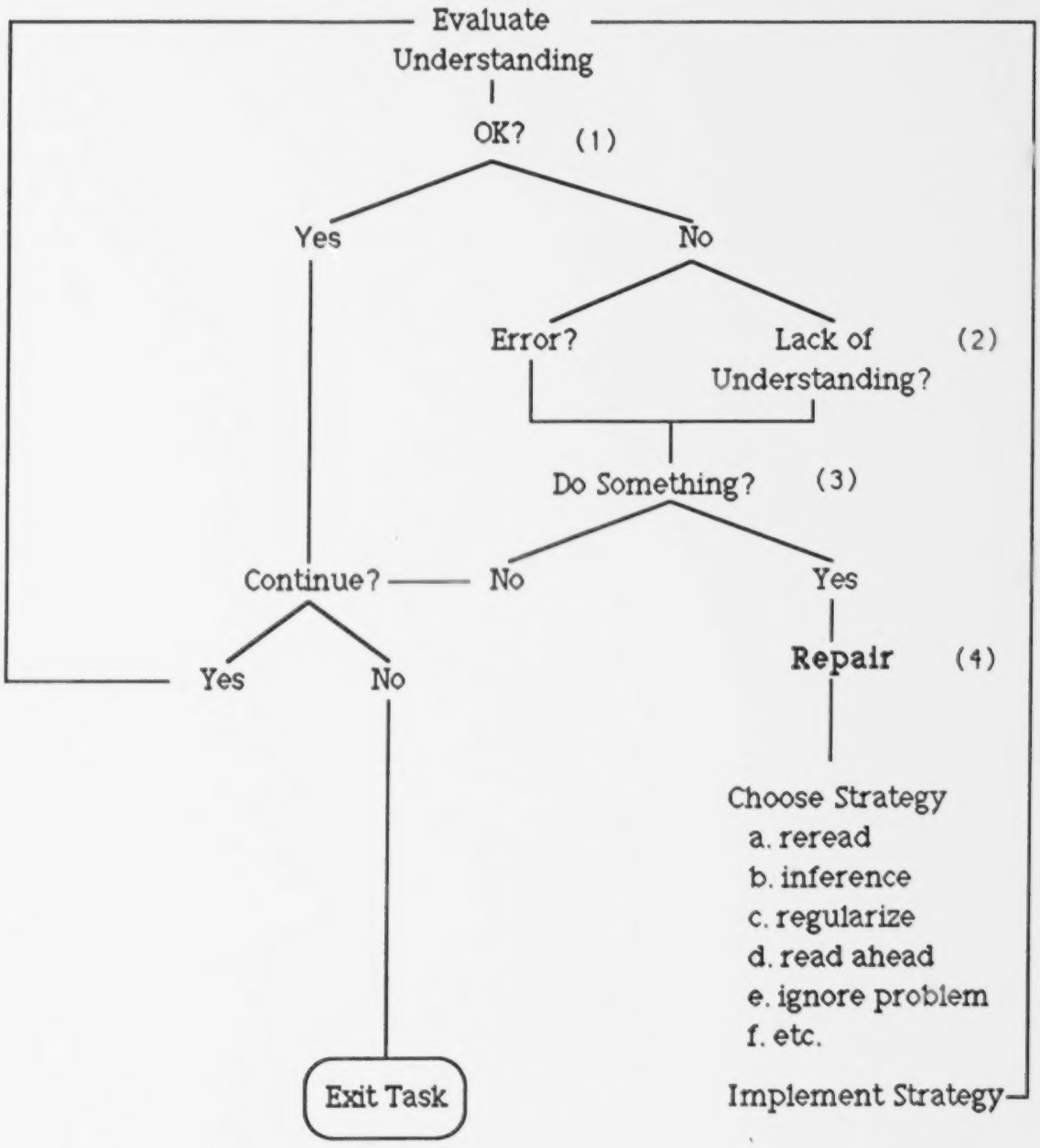
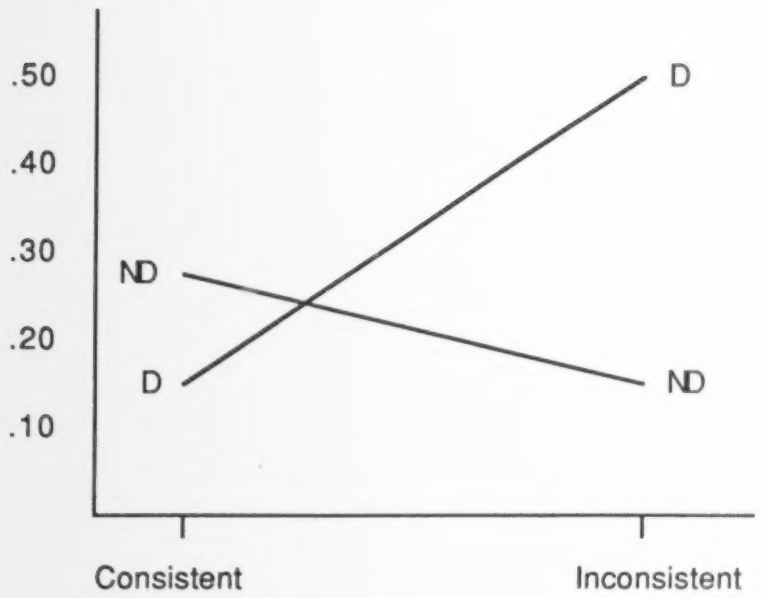

Evaluate
Understanding
OK? (1)
Yes
No
Error?
Lack of Understanding? (2)
Do Something? (3)
Continue?
No
Yes
Yes
No
Repair (4)
Choose Strategy
a. reread
b. inference
c. regularize
d. read ahead
e. ignore problem
f. etc.
Implement Strategy
Exit Task

Figure 1



Probability of Regressing at the Critical Line By Consistency and Detection Group

Figure 2